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# **Notice of Allowability**

Application No.

10/706,906

Examiner

Tod T. Van Roy

Applicant(s)

KIM, JIN K.

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**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--**

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to a response to first office action dated 02/22/2006.
2. ☒ The allowed claim(s) is/are 2,7,8,11,13-20,24,26 and 29-31.
3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
  - a) ☐ All b) ☐ Some\* c) ☐ None of the:
    1. ☐ Certified copies of the priority documents have been received.
    2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
    3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.
5. ☐ CORRECTED DRAWINGS ( as "replacement sheets") must be submitted.
  - (a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review ( PTO-948) attached
    - 1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.
  - (b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.

Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

## **Attachment(s)**

1. ☒ Notice of References Cited (PTO-892)
2. ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3. ☐ Information Disclosure Statements (PTO-1449 or PTO/SB/08), Paper No./Mail Date \_\_\_\_\_
4. ☐ Examiner's Comment Regarding Requirement for Deposit of Biological Material
5. ☐ Notice of Informal Patent Application (PTO-152)
6. ☐ Interview Summary (PTO-413), Paper No./Mail Date \_\_\_\_\_
7. ☐ Examiner's Amendment/Comment
8. ☒ Examiner's Statement of Reasons for Allowance
9. ☐ Other \_\_\_\_\_

## **DETAILED ACTION**

### ***Response to Amendment***

The examiner acknowledges the amending of claims 2, 7, 11, 15-20, 24, 26, 29, and 31, as well as the cancellation of claims 1, 3-6, 9-10, 12, 21-23, 25, 27-28, and 32-40.

### ***Allowable Subject Matter***

Claims 2, 7, 11, 15-20, 24, 26, 29, and 31 are allowed.

The following is an examiner's statement of reasons for allowance:

Because the preamble is important to the patentability of the present invention (i.e. "A tunnel junction" in claim 29), its significance will now be discussed. There is no litmus test for determining whether a preamble is limiting; rather, the effect of the preamble must be determined on a case-by-case basis. See *Catalina Mktg. Int'l v. Coolsavings.com, Inc.*, 289 F.3d 801, 808, 62 USPQ2d 1781, 1785 (Fed. Cir. 2002).

The preamble has the import that the claim as a whole suggests for it. *Bell Communications Research, Inc. v. Vitalink Communications Corp.*, 55 F.3d 615, 620, 34 USPQ2d 1816, 1820 (Fed. Cir. 1995). If it is necessary to give life and meaning to the claim, then the preamble will be construed as if it is a limitation in the balance of the claim. *Pitney Bowes, Inc. v. Hewlett-Packard Co.*, 182 F.3d 1298, 1305, 51 USPQ2d 1161, 1165-66 (Fed. Cir. 1999). Significantly, terminology which limits the structure of the invention will limit the claim, while statements that merely recite the intended use of

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the invention. *Compare* MPEP 2112.01 Part I (discussing structurally limiting preambles) *with* MPEP 2112.01 Part II (discussing intended use preambles).

In the present application it is clear that the preamble must be limiting and given patentable weight. The claim preamble of "A tunnel junction" gives life and meaning to the claim and defines a structural limitation; it is not merely drawn to the intended use of the device. One skilled in the art would understand that a tunnel junction has structural characteristics, for example adjacent highly doped layers of opposite conductivity, therefore the mention of a tunnel junction defines structure in the claim. Additionally, Applicant did not invent new layers, and in claim 29 merely describes their use may be in a tunnel junction. There is no suggestion that applicant has invented a new group of semiconductor layers generally; the invention lies in that these layers are a new tunnel junction itself. *See, e.g.*, Present Specification ¶ [001] ("This invention relates to . . . tunnel junctions."); *id.* ¶ [010] ("Even more beneficial would be a new tunnel junction . . . ."). One cannot say that it is intended use to use the layers in a tunnel junction, when the invention *is* a tunnel junction.

The claim body does not describe a structurally complete invention alone; it is merely a recitation of several layers of semiconductor material. Without the preamble, there is no context for the claimed invention. The preamble is necessary to give life and meaning to the claim, suggests structural features, and is more than just intended use. Thus the preamble is deemed to be limiting by the examiner.

Claims 7 and 29 are believed to be allowable as a tunnel junction, located in a VCSEL or otherwise, comprising a modulation doped layer of AlInAs comprised of a p-

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type digital alloy of AlAs and InAs was not found to be taught in the prior art, or an obvious combination of the prior art. Bour et al. (US 2004/0076209) was found to teach a VCSEL including a tunnel junction comprising a p-type AlInAs layer, but did not teach the AlInAs layer to be modulation doped or to comprise a digital alloy of AlAs and InAs. Bour et al. (US 2004/0161013) additionally teaches the use of AlInAs (undoped) in a tunnel junction to prevent migration of Zn towards the active region. Again, Bour does not teach the AlInAs layer to be modulation doped or to comprise a digital alloy of AlAs and InAs. Futatsugi et al. (US 5031005) teaches a tunneling *barrier* layer device that uses AlInAs material comprised of a superlattice of InAs and AlAs to balance strain on GaAs material, but does not teach the InAs and AlAs to be a digital alloy. Hall et al. (US 6472695) teaches a digital alloy of AlAs and InAs to form a pseudo AlInAs layer, but does not teach their use in a tunnel junction. Hall teaches the benefit of the layering is an improvement in oxidation efficiency and rates vs. that of growing tertiary AlInAs. Oxidation benefits do not provide for an improvement in tunneling junctions, and therefor, proper motivation does not exist to combine with Bour or Futatsugi. As the prior art did not present a clear use of a modulation doped layer of AlInAs comprised of a p-type digital alloy of AlAs and InAs found in a tunnel junction, or proper motivation to combine the various uses of the material, the claims are believed to be allowable.

Claims 2, 8, 15-20, 24, 26, and 30-31 are allowable as they depend from allowable claims 7 and 29.

Claim 11 is believed to be allowable as a tunnel junction, located in a VCSEL, including an n-type modulation doped layer comprising a SiAs and an AlGaInAs was not

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found to be taught in the prior art, or to be an obvious combination of the prior art. Kwon (US 2003/0156610) teaches an n-type AlGaInAs layer to be formed in a tunnel junction, but does not include the use of a SiAs layer or the layer to be modulation doped. As the prior art did not present a clear use of the modulation doped layer comprising AlGaInAs and SiAs, or proper motivation to combine uses of the material in the tunnel junction setting, the claims are believed to be allowable.

Claims 13-14 are allowable as they depend from allowable claim 11.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

### ***Conclusion***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. For the reasons stated in the "Reasons for Allowance" above, the following references are believed to be relevant: US 2004/0161013, 2004/0076209, 5031005, 6472695, and 2003/0156610.

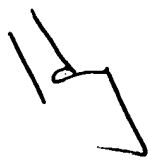

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tod T. Van Roy whose telephone number is (571)272-8447. The examiner can normally be reached on M-F.

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Minsun Harvey can be reached on (571)272-1835. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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MIN SUN HARVEY  
PATENT EXAMINER